differentiate. A curious example is the protective reaction of skunks. The smell of skunks causes sulfur compounds – thiols.[1] However, the unpleasant smell has its field of application. The natural gas that enters our homes contains a small part of tert-butyl thiol. Researches proved that people are able to feel one part of the thiol in 50 billion parts of methane. Some other compounds have delicious smells. For example, truffle that pigs can smell through a meter of soil and whose taste and smell is so delicious that they cost more than gold. Damascenons are responsible for the aroma of roses.[2] It is well-known that cats love to sleep at any time. Recently, scientists have received from the cats bones a substance that allows them to quickly fall asleep. It also acts on a person.

Worldwide volumes of the organic industry are estimated as millions of tons. This is good news for organic students. For example, ethyl alcohol is used as a material for the production of rubber, plastics, other organic compounds. The production of synthetic fibers has a turnover of more than 25 million tons per year. Sweeteners, such as classic sugar, are produced on a large scale. Other sweeteners, like aspartame (1965) and saccharin (1879) are produced in similar amounts.

Conclusion. Organic chemistry is the basis of our understanding of life, where substances are created naturally and artificially. The knowledge of Organic chemistry, organic compounds and their properties will help new generation to create new materials, discover new medicines and ways of their usage, develop our industry and economics.

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THE USE OF MODERN DIGITAL EQUIPMENT AND PC IN PHYSICAL EXPERIMENTS

Introduction. Taking into account the existing equipment of the physical laboratories of universities and higher education institutions, the problem of visualization of optical spectra and obtaining spectral characteristics is still relevant.

Analysis of works by Velychka S., Kovaleva S., Timofeieva M., Sviridova V. and others allows us to conclude that the solution of this problem is possible through the using of computer and digital technology.

Thus, in the work of Timofeev M. [3] discloses the principles of using high-speed digital cameras to obtain optical spectra. And in the article by Velychko S. and Kovalev S. [1] an analysis of the new spectral equipment is made, which allows the development of a number of new original laboratory works on optics. The authors of [2] describe in detail the method of using digital cameras to obtain weak optical spectra of fluorescent crystals and their subsequent mathematical processing. This technique is tested on emitters in the form of tungsten, hydrogen, helium, neon spectral lamps.

Results of research. Today, in almost all laboratories in the physics of higher education, spectrographs are used to record optical spectra. Optical spectra are fixed on the photo layer. Further analog-digital transformation is carried out on microfotometers. It is the microphotometry limited by the resolution of the optical elements of the channel microphotometer. Because of this, there are difficulties in selecting a photosensitive layer.

The most common and most accessible way of fixing physical objects during an experiment is a photo. Photographers use digital cameras that consist of an optical lens and a CMOS matrix, which represents a large number of photosensitive elements which converts the received photon stream into an electrical signal it encodes in a format that can then be played on a computer [4].

In our research to capture images, we used a modern digital camera Canon EOS 7D Mark II, which has the following characteristics: CMOS matrix 22.5 x 15.0 mm, effective number of pixels 20.2 million, photosensitivity 100-3200.

As objects of the research were selected two incandescent lamps, of 40W and 100W; two LED lamps, 40W each, but with different shades of light (white and orange); as a specimen of chemical luminescence was chosen, the stick, which shines in green, (used for work in extreme conditions or for entertainment).

To improve the accuracy of the measurements, it was decided to make a tightly closed camera with layer absorbing light inside. The camera was made of a cardboard box, covered with black paper inside it. For the samples in it we created a stand, which connected to an electrical current. Additionally, in order to improve the accuracy, blank photos were taken to empty the camera for further removal of digital noise and other data that could affect the results of the experiment.

All experimental photographic images were made with the same camera settings, namely: aperture f/4, shutter speed 1/1000 s, ISO-200, focal length – 41 mm. During the measurements, it was determined that for our experiment, these settings give the best result. As the standard was selected tungsten filament lamp power 40W. At settings, attention was paid to the clarity of the image, its saturation with light (the minimum possible exposure at ISO-200 value is displayed) and the illumination of the space around the light source.

Digital images of a tungsten incandescent lamp of 100W were recorded to observe the difference in the emission of samples of different capacities. There were also two LED lamps, one of which had a light filter on a warm shade of light. A sample of the light of a chemical stick is classified as luminescence and is of interest in its nature, because light does not occur as a result of heating, but because of chemical reactions inside the solution.

Further computer processing was based on the fact that the experimental image translates into the dependence of the intensity of radiation on the wavelength. Data processing is performed in programs specializing in mathematical calculations, such as MathCad.

Conclusion. The presented method of collecting experimental data using a digital camera has many advantages, since it does not require special skills in the technique, is relatively inexpensive in reproduction and does not require significant time expenditures. Processing of the resulting data experiment requires only the availability of a personal computer with the appropriate software.

In the future, it is planned to perform an analysis of calculations of the intensity of the radiation of the lamps from the wavelengths obtained in MathCad.

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ESTIMATES OF DISTRIBUTIONS OF FUNCTIONALS FROM THE MODULE OF STATIONARY GAUSSIAN PROPER COMPLEX RANDOM PROCESSES

This work deals with complex random processes which are one of the most important generalizations of the concept of random process. We presented results of estimates of distributions of functionals from the module of stationary Gaussian proper complex random processes are obtained (for more results see, for example, [1], [2]).

Theorem 1

Let $X(t)=\{X(t),t\in[a,b]\}$ be a Gaussian stationary proper complex random process and let $|X(t)|=\left(X_c^2(t)+X_s^2(t)\right)^{1/2}$. Then for $u\ge\left(\frac{p}{\sqrt{2}}+\sqrt{\left(\frac{p}{2}+1\right)p}\right)\sigma^2\left(b-a\right)^{1/b}$ the following inequality holds:

$$P\left\{\left\|X^2(t)-\sigma^2\right\|_{L_p([a,b])}>u\right\}\le 2\sqrt{1+\frac{u\sqrt{2}}{(b-a)^{1/p}\sigma^2}}\cdot\exp\left\{-\frac{u}{\sqrt{2}(b-a)^{1/p}\sigma^2}\right\}. \qquad (1)$$

Theorem 2

Let $X(t)=\{X(t),t\in[a,b]\}$ be a Gaussian stationary proper complex random process and let $|X(t)|=\left(X_c^2(t)+X_s^2(t)\right)^{1/2}$. If $X(t)$ is a separable process, then for all integer $M>1$ and all $u>\frac{2\sqrt{2}\sigma^2M}{\alpha}\left(\max\left(1,\left(\frac{b-a}{2}\right)^{\alpha/2}2\sqrt{c}\right)^{\frac{1}{M-1}}\right)$ we have:

$$P\left\{\sup\left|\left(X(t)\right)^2-\sigma^2\right|>x\right\}\le 4e^{\frac{2(M+1)}{\alpha}}\cdot\exp\left\{-\frac{x}{\sqrt{2}\sigma^2}\right\}\left(\frac{\alpha x}{2\sqrt{2}\sigma^2M}\right)^{\frac{2M}{\alpha}}\left(1+\frac{\sqrt{2}x}{\sigma^2}\right)^{1/2}. \qquad (2)$$

Conclusion. The complex random processes are especially relevant when the narrowbanded processes are investigated. These processes are exploited as models of complex amplitudes of quasiharmonic oscillations or waves in radiophysics and optics.